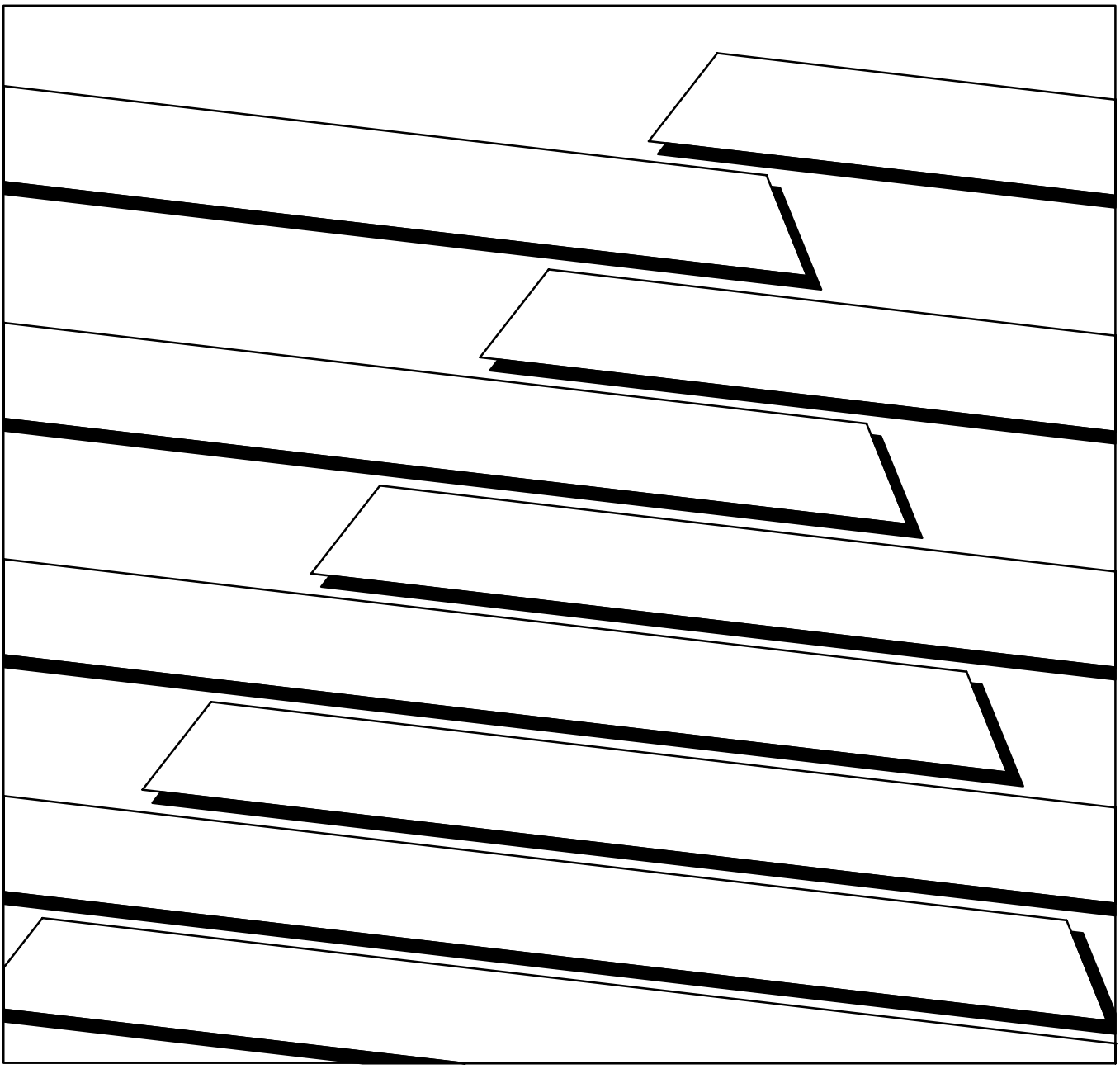
ALLEN-BRADLEY

Block I/O
Cat. No. 1791–IOBA and –IOBB
Series B

User Manual



Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI–1.1, “Safety Guidelines For The Application, Installation and Maintenance of Solid State Control” (available from your local Allen-Bradley office) describes some important differences between solid-state equipment and electromechanical devices which should be taken into consideration when applying products such as those described in this publication.

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Throughout this manual we make notes to alert you to possible injury to people or damage to equipment under specific circumstances.

ATTENTION: Tells readers where people may be hurt if procedures are not followed properly.

ATTENTION: Tells readers where machinery may be damaged or economic loss can occur if procedures are not followed properly.

Warnings and Cautions:

- Identify a possible trouble spot.
- Tell what causes the trouble.
- Give the result of improper action.
- Tell the reader how to avoid trouble.

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Important: We recommend you frequently backup your application programs on appropriate storage medium to avoid possible data loss.

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Using This Manual

Purpose of Manual

This manual shows you how to use your block I/O with an Allen–Bradley programmable controller. It helps you install, program and troubleshoot your module.

Audience

You must be able to program and operate an Allen–Bradley programmable controller (PLC) to make efficient use of block I/O modules.

We assume that you know how to do this in this manual. If you do not, refer to the appropriate PLC programming and operations manual before you attempt to program this module.

Vocabulary

In this manual, we refer to:

- the block I/O module as the “block” or the “module”
- the programmable controller as the “controller”

Manual Organization

This manual is divided into 5 chapters. The following chart shows each chapter with its corresponding title and brief overview of the topics covered in that chapter.

Chapter	Title	Topics Covered
1	Introducing Block I/O	Description of the modules, including general and hardware features
2	Installing Block I/O	Module power requirements, location, and wiring information
3	Configuring Your Block I/O for PLC Family Programmable Controllers	How to set the configuration switches and address the block I/O.
4	Configuring Your Block I/O for SLC Controllers	How to set the switches, and where to go for full information
5	Troubleshooting	How to use the indicators to troubleshoot your block I/O module.
Appendix A	Specifications	Specifications for the block I/O.

About Block I/O

Block I/O consists of small, self–contained remote I/O devices complete with power supply, programmable controller interface, input/output connections and signal conditioning circuitry. Table P.A is a list of available block I/O modules.

Table P.A
Types of Block I/O

Catalog Number	Description	Publication Number
1791–IOBA	8 sinking inputs, 8 sourcing outputs	1791–6.5.8
1791–IOBB	10 sinking inputs, 6 sourcing outputs	
1791–IOVA	8 sourcing inputs, 8 sinking outputs	1791–6.5.6
1791–IOVB	10 sourcing inputs, 6 sinking outputs	
1791–IOBW	32 sinking inputs, 32 sourcing outputs	1791–6.5.7
1791–IOVW	32 sourcing inputs, 32 sinking outputs	
1791–IOBX	64 sinking inputs, 64 sourcing outputs	1791–6.5.2
1791–IOVX	64 sourcing inputs, 64 sinking outputs	

This publication covers the 1791–IOBA/B and –IOBB/B block I/O modules. The 1791–IOBA/B has 8 inputs and 8 outputs; the 1791–IOBB/B has 10 inputs and 6 outputs. In all other respects, they are identical.

Related Publications

For a list of publications with information on Allen–Bradley programmable controller products, consult our publication index (SD499).

Chapter 1

Introducing Block I/O

Chapter Objectives

In this chapter you will learn what block I/O is, its features, and how it functions.

General Description

1791–IOBA/B and –IOBB/B block I/O modules are small, self–contained remote I/O devices complete with power supply, programmable controller interface, input/output connections and signal conditioning circuitry.

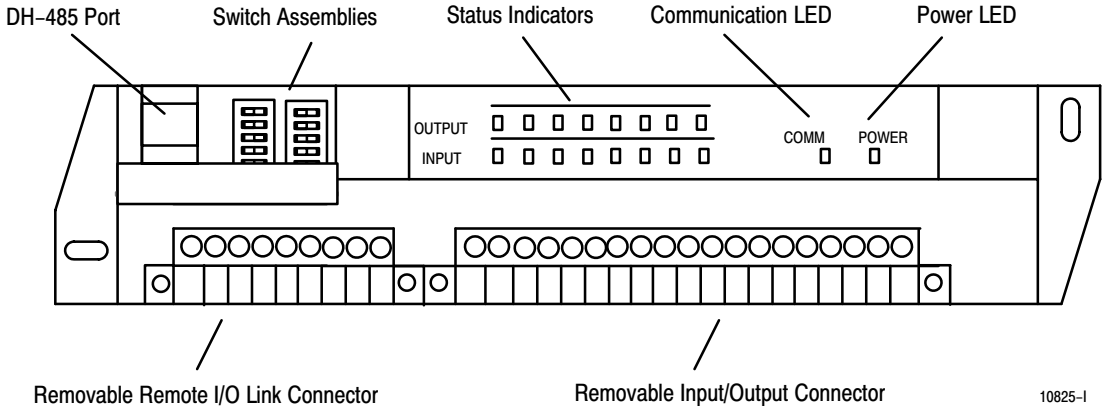
The 1791–IOBA/B has 8 inputs and 8 outputs; the 1791–IOBB/B has 10 inputs and 6 outputs. In all other aspects, they are identical.

The blocks are compatible with PLC–2®, PLC–3®, and PLC–5® family programmable controllers, and the SLC® 500 modular controllers. Refer to the table below for information on using block I/O with various Allen-Bradley programmable controllers.

If You are Using:	You must use:
PLC–2 family programmable controller	1771–SN sub–I/O scanner or 1771–SD2 remote I/O scanner
PLC–3 family programmable controller	Block attaches directly to controller
PLC–5 family programmable controller	
SLC 500 programmable controller	1747–DSN scanner or 1747–SN remote I/O scanner

Figure 1.1 shows the physical features of the block I/O.

Figure 1.1
Major Features of the Block I/O Module (1791–IOBA/B shown)



Wiring Connectors – Remote I/O link connector and input/output connector are removable for easy connection of wiring.

Switch Assemblies – Two DIP switches are provided for setting the I/O rack number, starting I/O group, transmission rate, last chassis, last state and DH–485 terminator.

Status Indicators – LED indicators display the status of communication, power and input/output. These provide a visual indication for aid in troubleshooting.

DH–485 Port – A plug–in DH–485 data port is provided for use with the SLC controller.

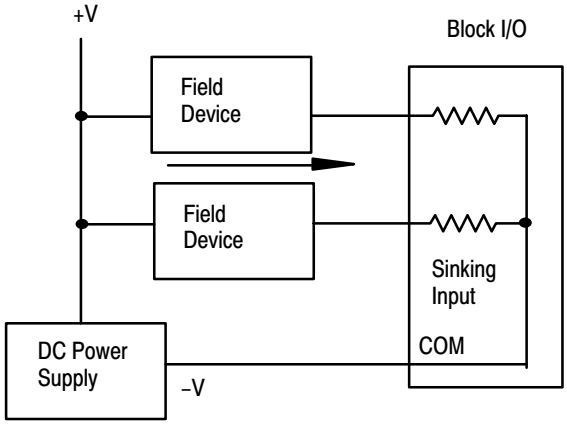
How Block I/O Fits in a PLC System

Block I/O is a complete I/O interface that includes the functionality of the I/O rack, adapter, power supply, and I/O modules in a single unit. Connect sensors and actuators to the module and use the remote I/O cable to connect the block I/O to your programmable controller as shown in chapter 2.

The block uses sinking inputs and sourcing outputs.

In sinking inputs (Figure 1.2), the dc common is bussed on the block. and the current is sourced from the field device. The sourcing field device switches the hot side of the power supply bus causing current to flow through the sourcing device to the sinking input on the block.

Figure 1.2
Sinking Input Example



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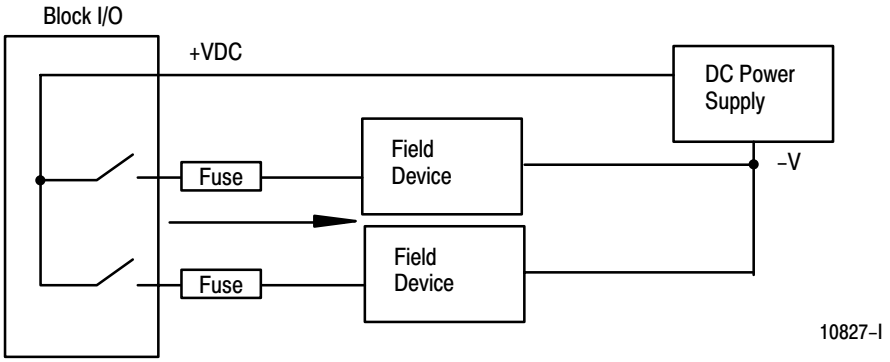
Sourcing outputs (Figure 1.3) have the power bussed in the block. When the output is on, current is supplied to the field control device, which sinks the current. The field circuit and the equipment remain at ground potential until the output is turned on.

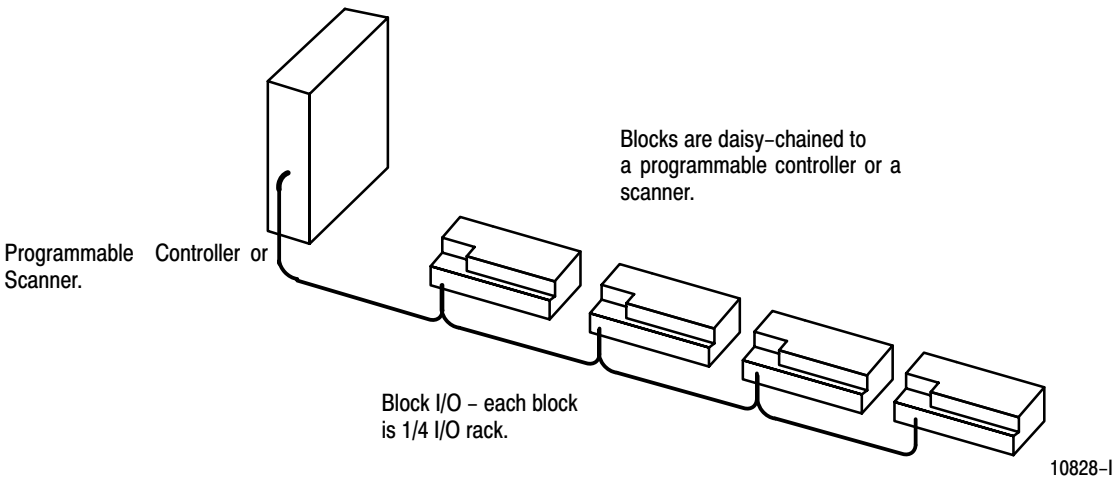
Figure 1.3
Sourcing Output Example



You connect the block I/O to your remote I/O link as you would any other device (Figure 1.4). The block looks like a 1/4 I/O rack to the processor, and uses 2 words of input image table memory and 2 words of output image table memory. The block is addressed directly on the remote I/O link.

Block I/O functions exactly like any Allen–Bradley remote I/O product. Input and output data is scanned asynchronously and transferred back and forth between the block and the controller input and output image table.

Figure 1.4
Block I/O Connection in a PLC System


Blocks are daisy–chained to a programmable controller or a scanner.
Programmable Controller or Scanner.
Block I/O – each block is 1/4 I/O rack.
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Chapter 2

Installing Block I/O

Chapter Objectives

In this chapter you will learn how to mount the block, connect the remote I/O link, connect the input and output wiring to the block, and terminate the remote I/O link.

Pre–installation Considerations

Before installation, you must determine:

- the number of blocks desired
- the total distance of the installation
- transmission rate desired
- if external fuses are required

Acceptable combinations are shown in Table 2.A.

Table 2.A
Acceptable Combinations of Processor and Block I/O

When using	and	Maximum Capacity	Baud Rate Used	Maximum Network Distance
PLC–2 family	1771–SN	16 blocks with 150 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
	1772–SD, 1772–SD2	16 blocks/channel, 28 blocks/scanner with 150 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
PLC–3 family	Any PLC–3 scanner module	16 blocks/channel, 64 blocks/scanner with 150 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
	1775–S5, or –SR5 module	32 blocks/channel, 64 blocks/scanner with 82 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
			230.4K	2,000 cable–feet
PLC–5 family	PLC–5/15	12 blocks with 150 ohm terminator	57.6K	10,000 cable–feet
	PLC–5/25	16 blocks with 150 ohm terminator, 28 blocks with 82 ohm terminator	57.6K	10,000 cable–feet
	PLC–5/30	16 blocks/channel, 28 blocks per processor with 150 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet

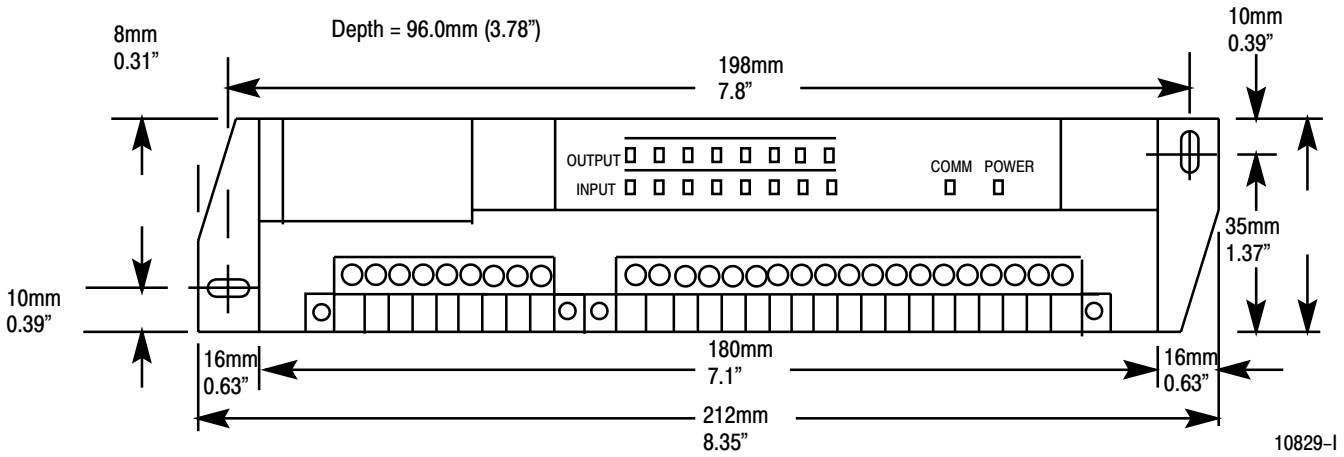
When using	and	Maximum Capacity	Baud Rate Used	Maximum Network Distance
PLC–5 family (continued)	PLC–5/30	28 blocks/channel, 28 blocks per processor with 82 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
			230.4K	2,500 cable–feet
	PLC–5/40L, PLC–5/60L	16 blocks/channel, 32 blocks per processor with 150 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
		32 blocks/channel, 60 blocks per processor with 82 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
			230.4K	2,500 cable–feet
	PLC–5/40, PLC–5/60	16 blocks/channel, 60 blocks per processor with 150 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
		32 blocks/channel, 60 blocks per processor with 82 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
			230.4K	2,500 cable–feet
	PLC–5250 – requires a 5150–RS remote scanner	16 blocks/channel, 32 blocks/scanner, 64 blocks/(2 scanners) with 150 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
		32 blocks/channel, 32 blocks/scanner, 64 blocks/(2 scanners) with 82 ohm terminator	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
			230.4K	2,500 cable–feet
SLC–5/01 Controller	1747–DSN Scanner module*	7 blocks	230.4K	2,500 cable–feet
SLC–5/02 Controller	1747–DSN Scanner module*	30 blocks	230.4K	2,500 cable–feet
SLC–5/02 Controller	1747–SN Remote I/O Scanner Module*	16 blocks	57.6K	10,000 cable–feet
			115.2K	5,000 cable–feet
			230.4K	2,500 cable–feet

* The DH–485 network, which operates independent of the remote I/O/distributed I/O network, supports up to 30 DH–485 nodes (blocks or 1747–AIC isolated couplers). The maximum DH–485 network distance is 4,000 cable–feet.

Installing the Block I/O

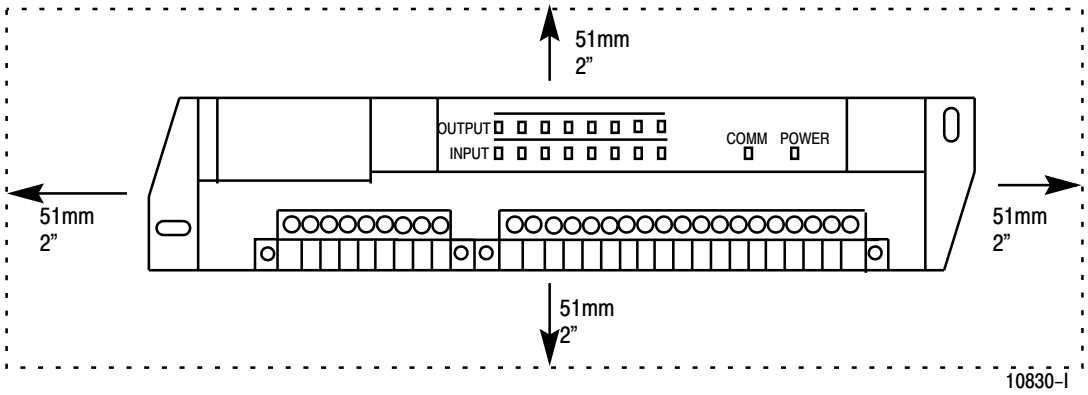
Figure 2.1 shows the mounting dimensions for the block I/O module. Mount the blocks horizontally with a minimum of 2” between blocks. This air gap is necessary to maintain proper cooling air flow through the block.

Figure 2.1
Mounting Dimensions for the Block I/O Module (Cat. No. 1791–IOBA/B and –IOBB/B)



The operating temperature in the air gap between block I/O modules must not exceed 55ºC (151ºF). Figure 2.2 shows the dimensions of the required air gap.

Figure 2.2
Clearance Required for Block I/O Modules



Connecting Wiring

Connections to the block I/O module are made to the removable connectors which plug into the front of the block. The connector blocks are keyed to prevent incorrect insertion and are secured by screws.

Wiring for the block is shown in Figure 2.3 and Figure 2.4. Remote I/O wiring connections are shown in Figure 2.5.

Figure 2.3
Input and Output Connections for the 1791–IOBA/B

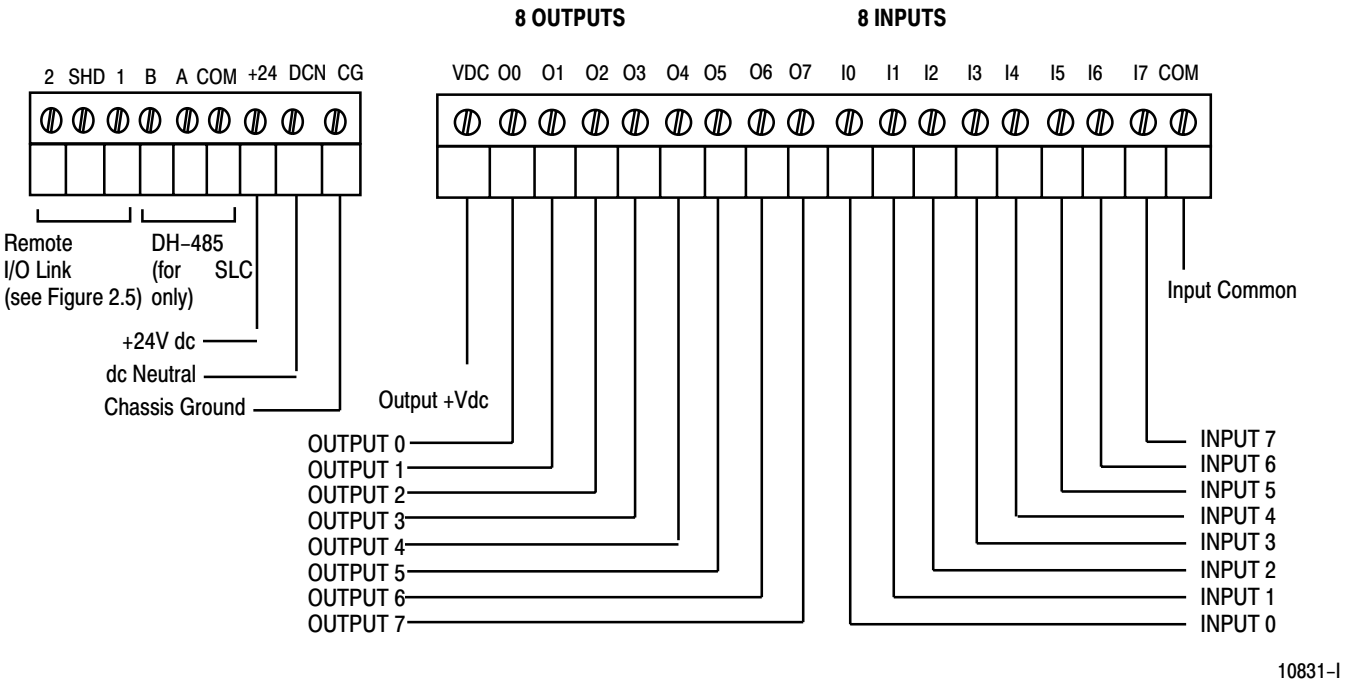


Figure 2.4
Input/Output Wiring Connections for the 1791–IOBB/B

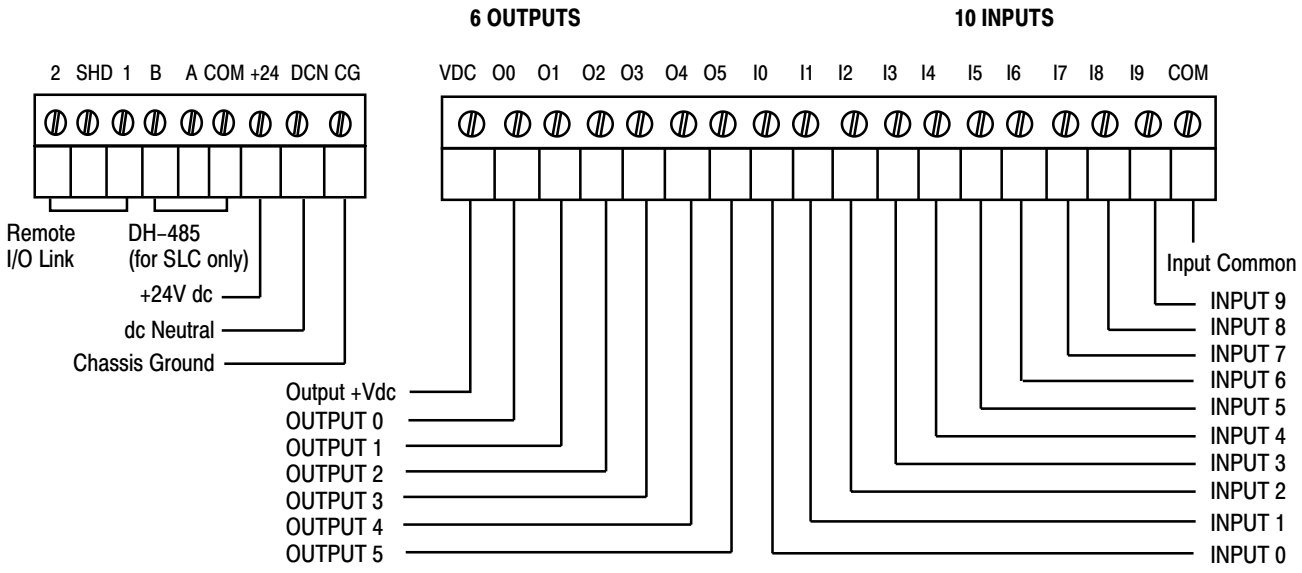


Table 2.B
Wiring Block Designations

Connector	1791–IOBA		1791–IOBB	
	Designation	**Description**	**Designation**	**Description**
Remote I/O Connector	1	Blue wire – RIO	1	Blue wire – RIO
	2	Clear wire – RIO	2	Clear wire – RIO
	SHD	Shield – RIO	SHD	Shield – RIO
	A	DH–485 A	A	DH–485 A
	B	DH–485 B	B	DH–485 B
	COM	DH–485 Common	COM	DH–485 Common
	+24	+24V dc	+24	+24V dc
	DCN	dc neutral	DCN	dc neutral
	CG	Chassis ground	CG	Chassis ground
I/O Connector	VDC	Output supply	VDC	Output supply
	O0 thru O7	Output 0 thru 7	O0 thru O5	Output 0 thru 5
	I0 thru I7	Input 0 thru 7	I0 thru I9	Input 0 thru 9
	COM	Input common	COM	Input common

Power Supply Requirements

An external 24V dc power supply is required to power the block. Total current required to power the block is equal to 200mA plus an inrush of 5.5A for 10µsec for each block. The supply must be able to source an additional 100mA plus an inrush current of 400mA when a peripheral is connected.

In addition, the external power supply should have current limiting capabilities. The voltage range must not exceed 20.5–27.6V dc.

Wiring Requirements

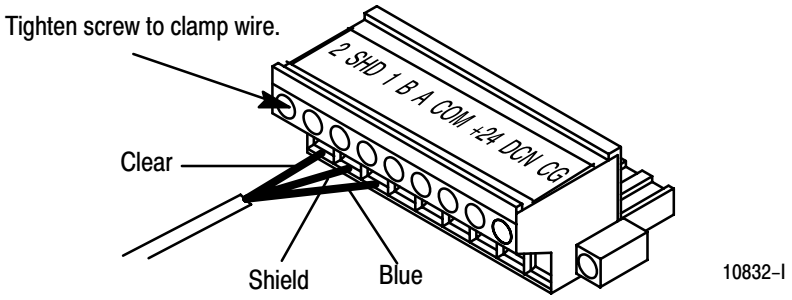
Table 2.C shows the wiring cable requirements for the 1791–IOBA/B and 1791–IOBB/B modules.

Table 2.C
Acceptable Wiring Cables for Block I/O Connection

Use	Cable Type	With
Remote I/O Link or DIO Link	Belden 9463	PLC–2, PLC–3, PLC–5 family programmable controllers and SLC controllers
DH–485 Data Link	Belden 9842	SLC controllers only
Input and Output wiring	Up to 14AWG Stranded with 3/64 inch insulation	All

Figure 2.5
Remote I/O Link Wiring

Connection	1	2	SHD
Clear wire		X	
Blue wire	X		
Shield wire			X



Remote I/O Link or Distributed I/O Link Wiring

Blocks must be wired in series as shown in Figure 2.6 or Figure 2.7. Do not attempt to wire any block in parallel.

The number of blocks used depends not only on the user requirements but also on the system used. Refer to Table 2.A (page 2-1) for maximum block usage for individual systems.

Figure 2.6
Series Connection for Block I/O Using PLC–2, PLC–3 or PLC–5 Family Programmable Controllers

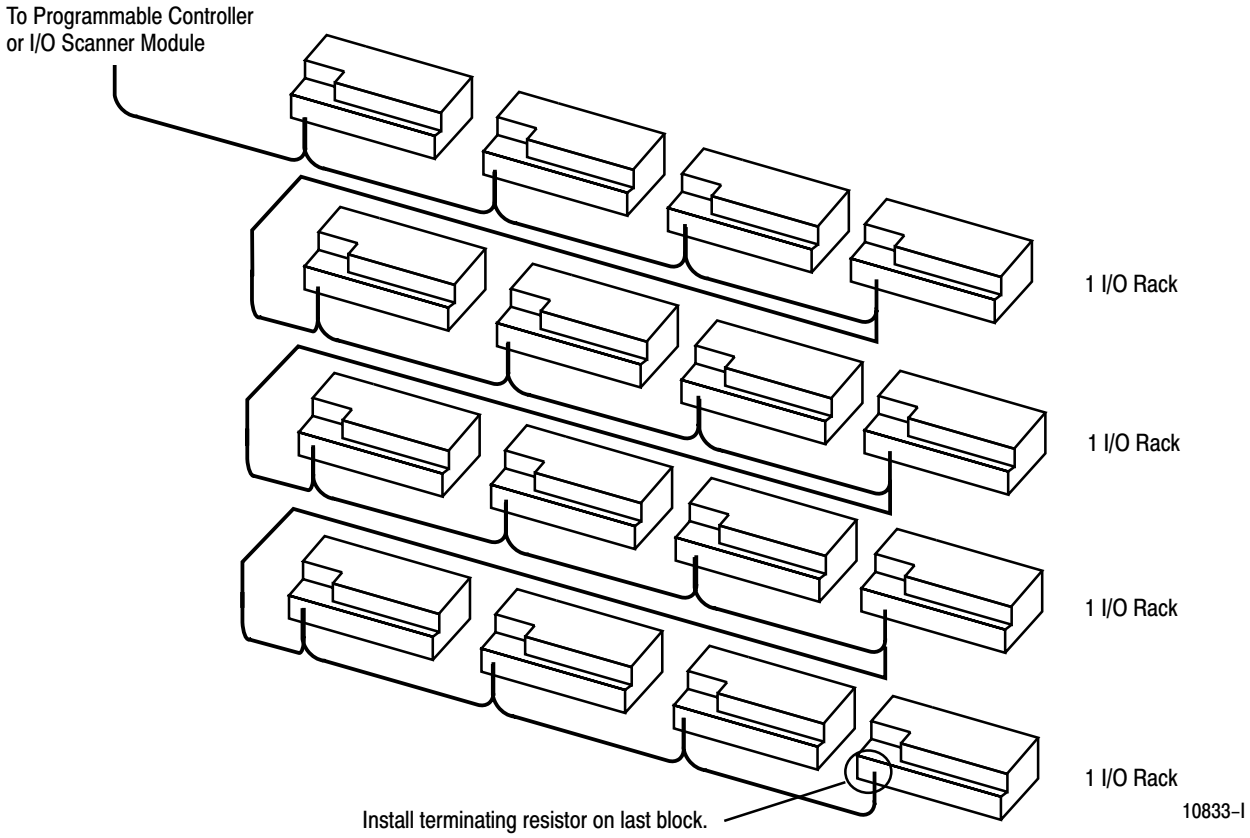
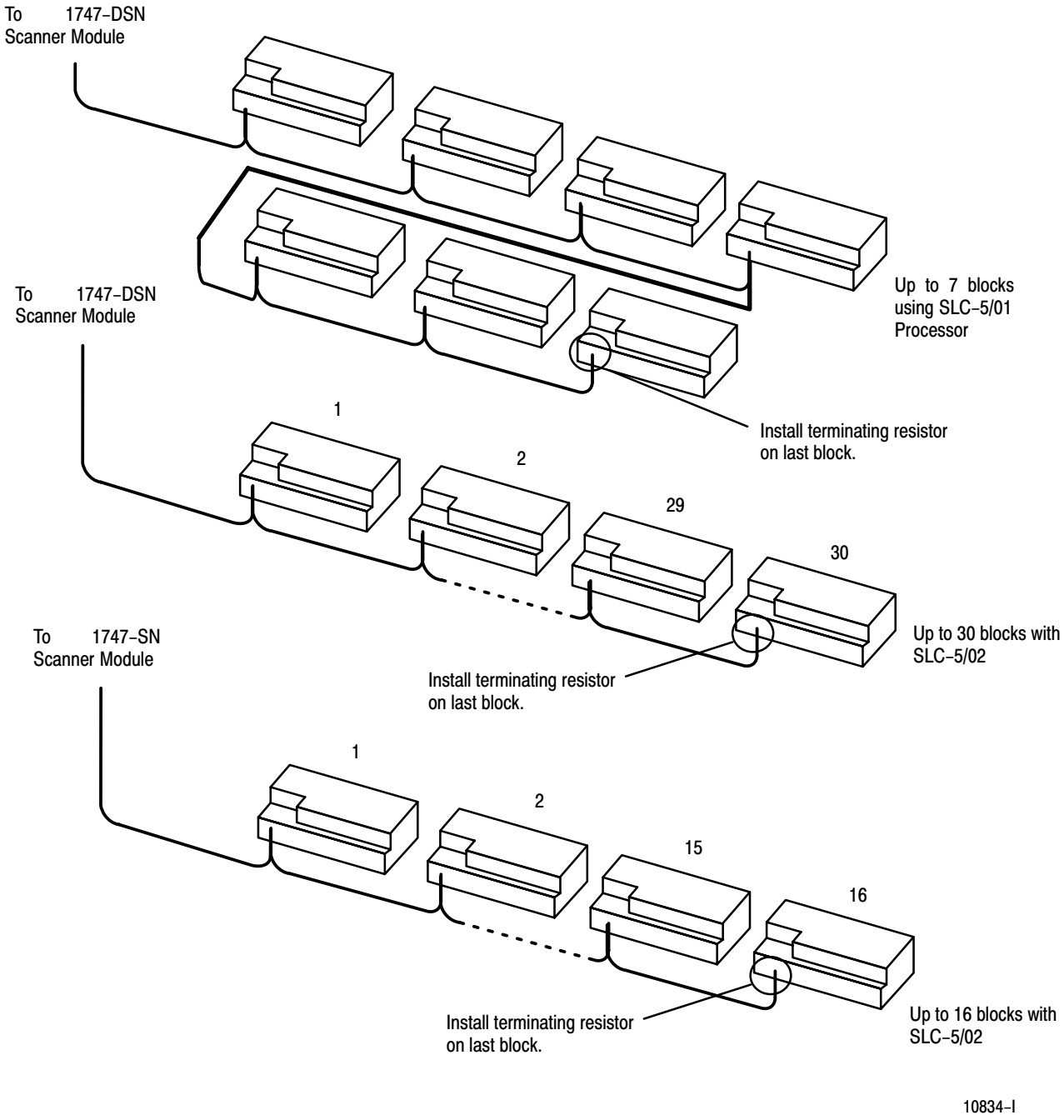


Figure 2.7
Series Configurations for Block I/O Using the SLC Programmable Controller



Termination Resistor

A termination resistor must be installed on the last block in a series. Connect the resistor as shown in Figure 2.8. Use the resistor as identified in Table 2.D.

Figure 2.8
Installing the Termination Resistor

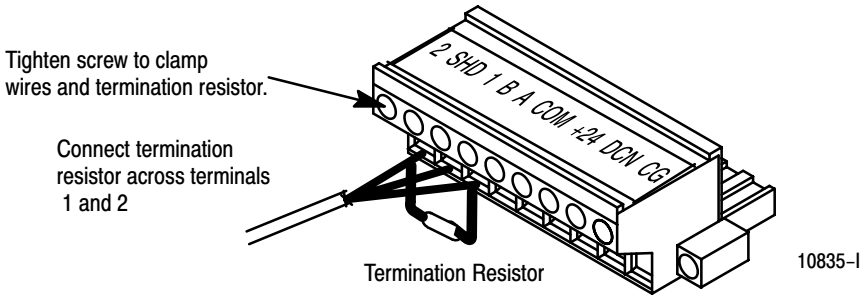

Tighten screw to clamp wires and termination resistor.
Connect termination resistor across terminals 1 and 2
2 SHD 1 B A COM +24 DCN CG
Termination Resistor
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Table 2.D
Terminator Requirements

System	Terminator Resistor
PLC–2, PLC–3, PLC–5 family, SLC 500 family	150 ohm – 57.6K and 115.2K baud 82 ohm – 230.4K baud

Extended Node Capability

If this is the last remote I/O adapter on the remote I/O link in a PLC system, you must use a terminating resistor to terminate both ends of the remote I/O link (scanner end and last block end). The size of the terminator is determined by the system configuration.

Older configurations can use a 150 ohm resistor at both ends. With newer devices that can support it, you can use an 82 ohm termination resistor at both ends. The 82 ohm terminators provide “extended node” capability which allows you to have up to 32 physical devices on the remote I/O link. (The number of logical racks capable of being addressed by the scanner is not affected.)

ATTENTION: Devices that are operating at 230.4K baud must have 82 ohm terminators in place for proper operation.

Compatibility of 1771 I/O Products with Extended Node Numbers

Certain products are **not compatible** with extended node capabilities obtained with the use of 82 ohm terminators. Table 2.E lists those products that are **not compatible**.

Table 2.E
Non–compatible Products

Device		Series
Scanners –	1771–SN	All
	1772–SD	All
	1772–SD2	All
	1775–SR	All
	1775–S4A	All
	1775–S4B	All
Adapters –	1771–AS	All
	1771–ASB	Series A
	1771–DCM	All
Miscellaneous –	1771–AF	All
	1771–AF1	All

Chapter 3

Configuring Your Block I/O for PLC Family Programmable Controllers

Chapter Objectives

In this chapter you will learn how to configure your block I/O when used with PLC family programmable controllers. This includes the following:

- setting the configuration switches
- addressing the block I/O

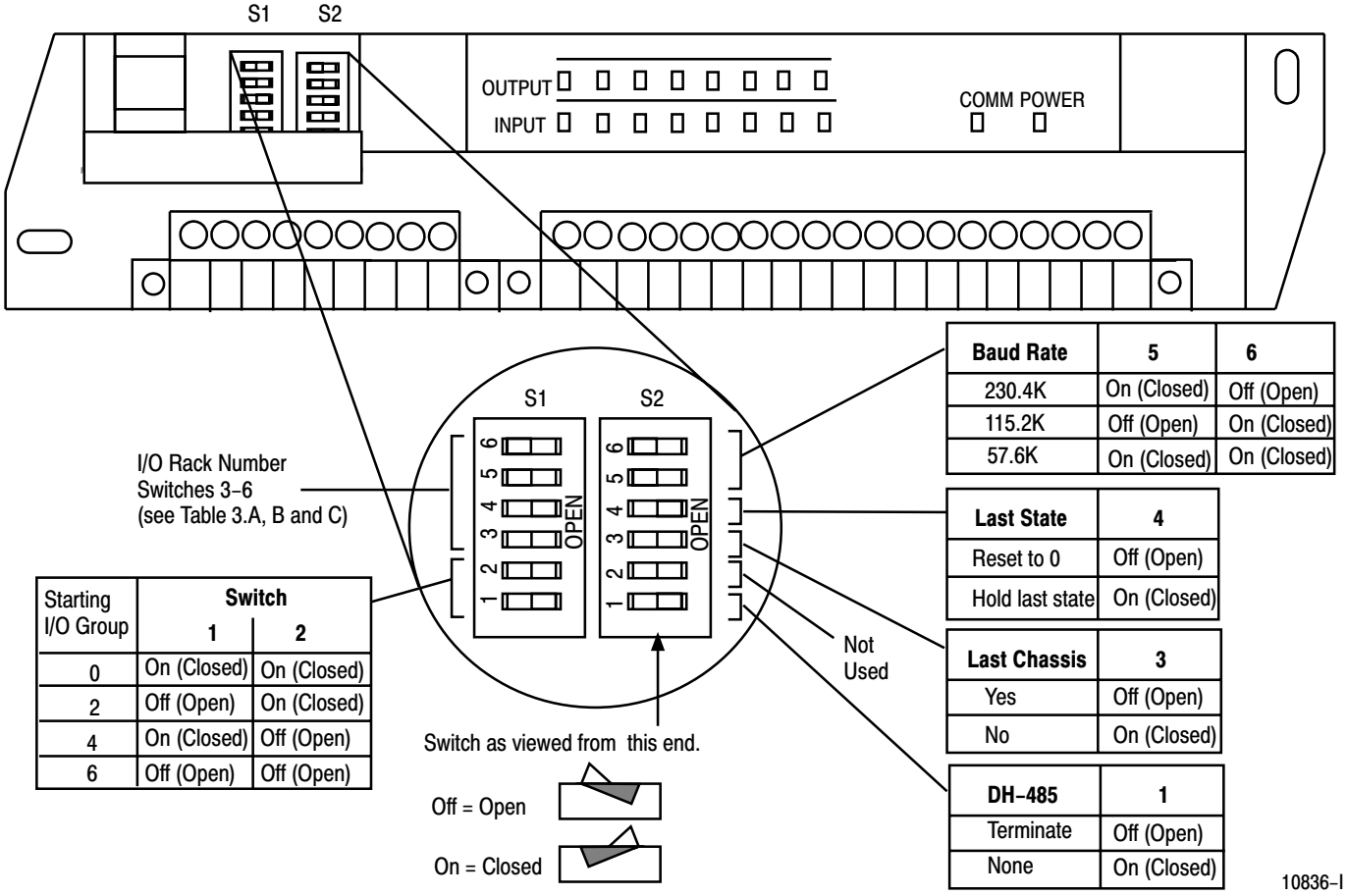
Setting the Configuration Switches

Each block I/O module has two 6–position DIP switches for setting:

- starting I/O group
- I/O rack number
- transmission (baud) rate
- last chassis
- last state
- DH–485 terminator

These switches are accessible by opening the door on the left side of the module (Figure 3.1).

Figure 3.1
Switch Settings for 1791–IOBA/B and –IOBB/B



Starting I/O Group	Switch 1	Switch 2
0	On (Closed)	On (Closed)
2	Off (Open)	On (Closed)
4	On (Closed)	Off (Open)
6	Off (Open)	Off (Open)

Baud Rate	5	6
230.4K	On (Closed)	Off (Open)
115.2K	Off (Open)	On (Closed)
57.6K	On (Closed)	On (Closed)

Last State	4
Reset to 0	Off (Open)
Hold last state	On (Closed)

Last Chassis	3
Yes	Off (Open)
No	On (Closed)

DH–485	1
Terminate	Off (Open)
None	On (Closed)

Table 3.A
Addressing PLC–2 Family Processors

I/O Rack Number	Switch Number 3	4	5	6
1	On (Closed)	On (Closed)	On (Closed)	On (Closed)
2	Off (Open)	On (Closed)	On (Closed)	On (Closed)
3	On (Closed)	Off (Open)	On (Closed)	On (Closed)
4	Off (Open)	Off (Open)	On (Closed)	On (Closed)
5	On (Closed)	On (Closed)	Off (Open)	On (Closed)
6	Off (Open)	On (Closed)	Off (Open)	On (Closed)
7	On (Closed)	Off (Open)	Off (Open)	On (Closed)

Table 3.B
Addressing PLC–3 and PLC–5/250 Processors

I/O Rack Number	Switch Number 3	4	5	6	I/O Rack Number	Switch Number 3	4	5	6
0	On (Closed)	On (Closed)	On (Closed)	On (Closed)	10	On (Closed)	On (Closed)	On (Closed)	Off (Open)
1	Off (Open)	On (Closed)	On (Closed)	On (Closed)	11	Off (Open)	On (Closed)	On (Closed)	Off (Open)
2	On (Closed)	Off (Open)	On (Closed)	On (Closed)	12	On (Closed)	Off (Open)	On (Closed)	Off (Open)
3	Off (Open)	Off (Open)	On (Closed)	On (Closed)	13	Off (Open)	Off (Open)	On (Closed)	Off (Open)
4	On (Closed)	On (Closed)	Off (Open)	On (Closed)	14	On (Closed)	On (Closed)	Off (Open)	Off (Open)
5	Off (Open)	On (Closed)	Off (Open)	On (Closed)	15	Off (Open)	On (Closed)	Off (Open)	Off (Open)
6	On (Closed)	Off (Open)	Off (Open)	On (Closed)	16	On (Closed)	Off (Open)	Off (Open)	Off (Open)
7	Off (Open)	Off (Open)	Off (Open)	On (Closed)	17	Off (Open)	Off (Open)	Off (Open)	Off (Open)

Table 3.C
Addressing PLC–5 I/O Processors

I/O Rack Number	Switch Number 3	4	5	6	I/O Rack Number	Switch Number 3	4	5	6
01	Off (Open)	On (Closed)	On (Closed)	On (Closed)	10	On (Closed)	On (Closed)	On (Closed)	Off (Open)
02	On (Closed)	Off (Open)	On (Closed)	On (Closed)	11	Off (Open)	On (Closed)	On (Closed)	Off (Open)
03	Off (Open)	Off (Open)	On (Closed)	On (Closed)	12	On (Closed)	Off (Open)	On (Closed)	Off (Open)
PLC–5/15 processors can scan racks 01–03					13	Off (Open)	Off (Open)	On (Closed)	Off (Open)
04	On (Closed)	On (Closed)	Off (Open)	On (Closed)	14	On (Closed)	On (Closed)	Off (Open)	Off (Open)
05	Off (Open)	On (Closed)	Off (Open)	On (Closed)	15	Off (Open)	On (Closed)	Off (Open)	Off (Open)
06	On (Closed)	Off (Open)	Off (Open)	On (Closed)	16	On (Closed)	Off (Open)	Off (Open)	Off (Open)
07	Off (Open)	Off (Open)	Off (Open)	On (Closed)	17	Off (Open)	Off (Open)	Off (Open)	Off (Open)
PLC–5/25 processors can scan racks 01–07					**PLC–5/40 and 5/60 processors can scan racks 01–17**				

Each block uses 2 words of output image table memory and 2 words of input image table memory. Each block occupies 1/4 rack of data table, with 4 blocks comprising 1 logical rack. Image table usage for one assigned rack number is shown in Figure 3.2 (IOBA) and Figure 3.4 (IOBB). An example of image table usage is shown in Figure 3.3 (IOBA) and Figure 3.5 (IOBB).

Figure 3.2
I/O Image Table for One Assigned Rack Number with 1791–IOBA/B

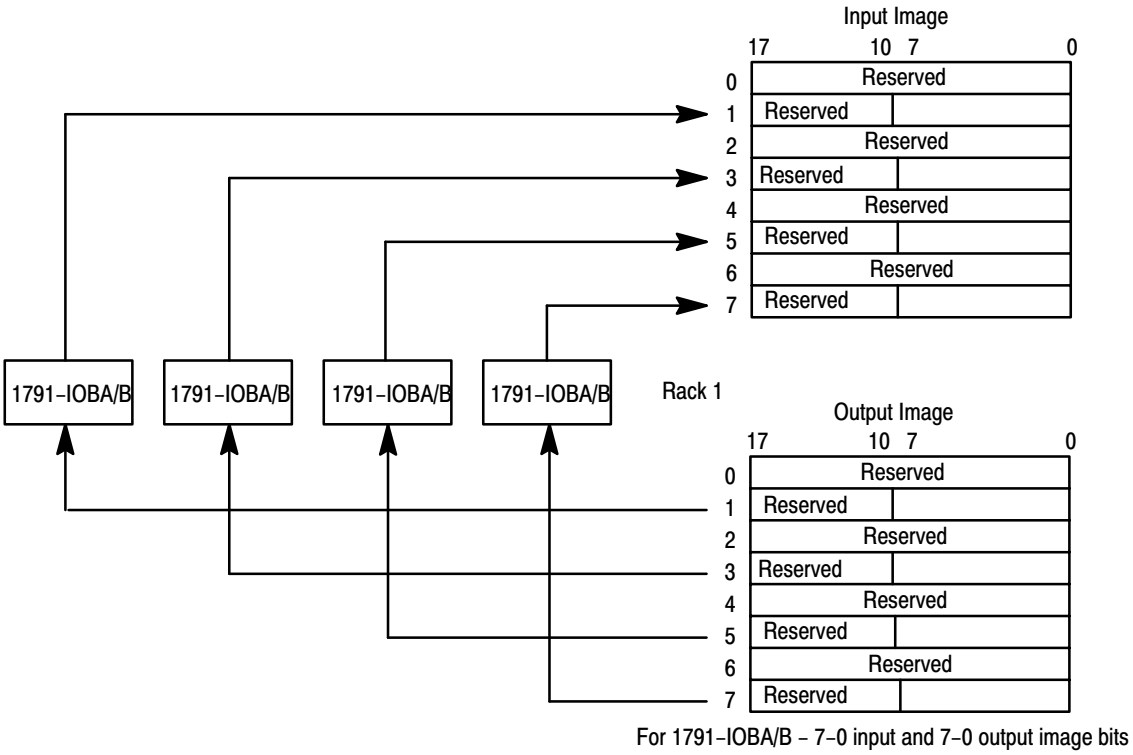


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Figure 3.3
Input Table Usage Example for One Starting I/O Group with 1791–IOBA/B

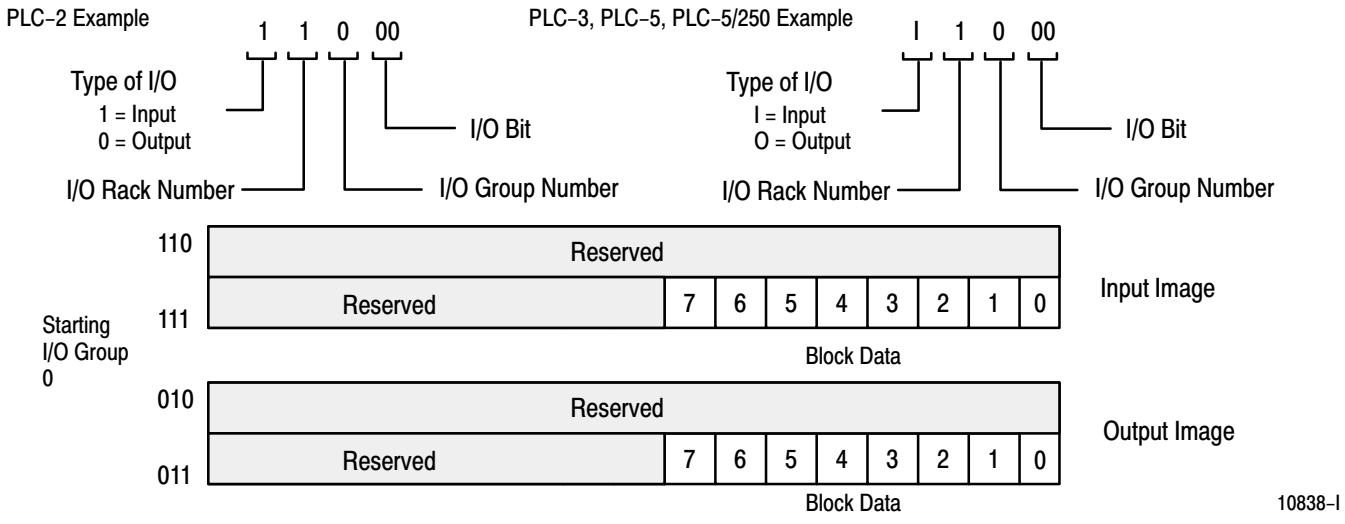

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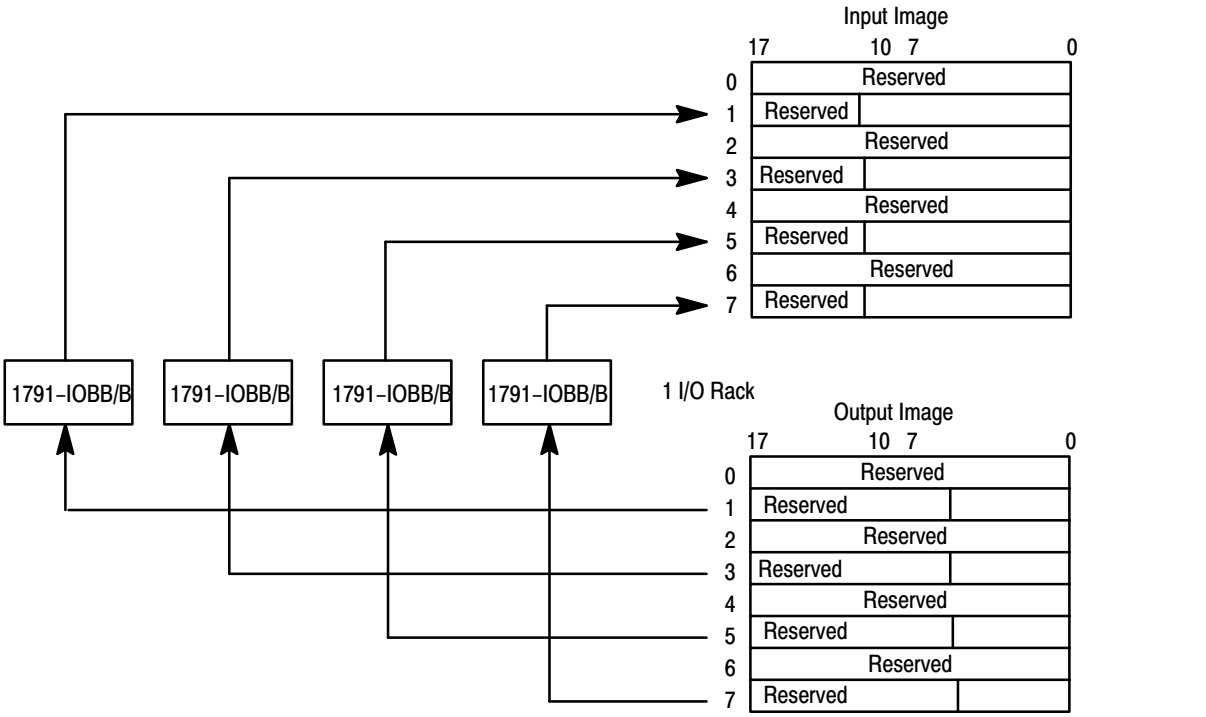
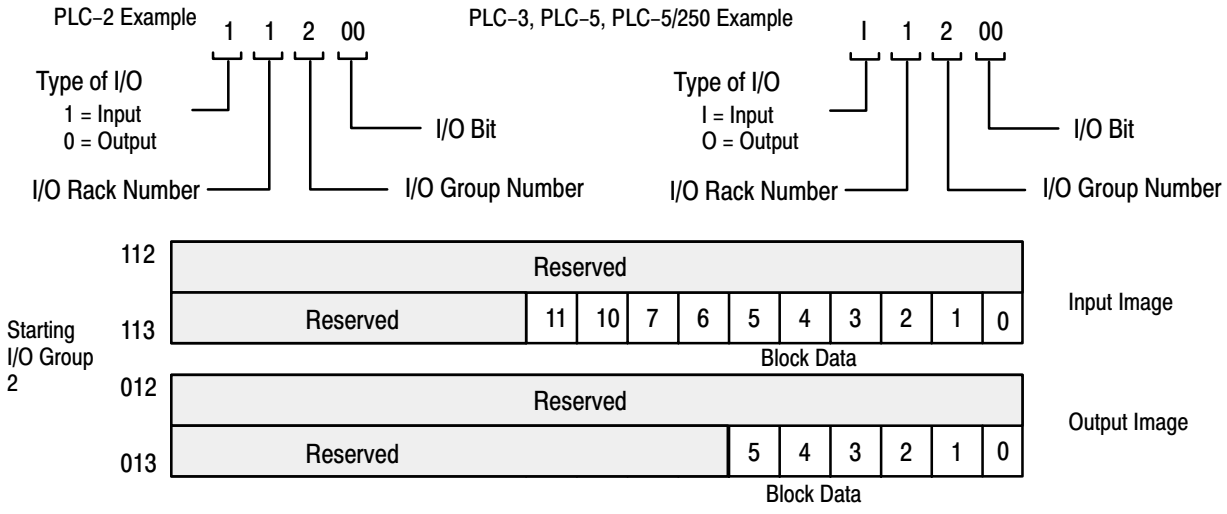
Figure 3.4
I/O Image Table for One Assigned Rack Number with 1791–IOBB/B



For 1791–IOBB/B – 11–0 input and 5–0 output image bits

Figure 3.5
Input Table Usage Example for One Starting I/O Group with 1791–IOBB/B



Chapter 4

Configuring Your Block I/O for SLC Controllers

Chapter Objectives

In this chapter you will learn how to configure your block I/O when used with SLC family controllers. This includes the following:

- setting the configuration switches
- addressing the block I/O

Refer to publication 1747–NM004 Series A, “Distributed I/O Scanner,“ and publication 1747–NM005 Series A, “RIO Scanner” for complete information on switch settings and addressing of the block I/O.

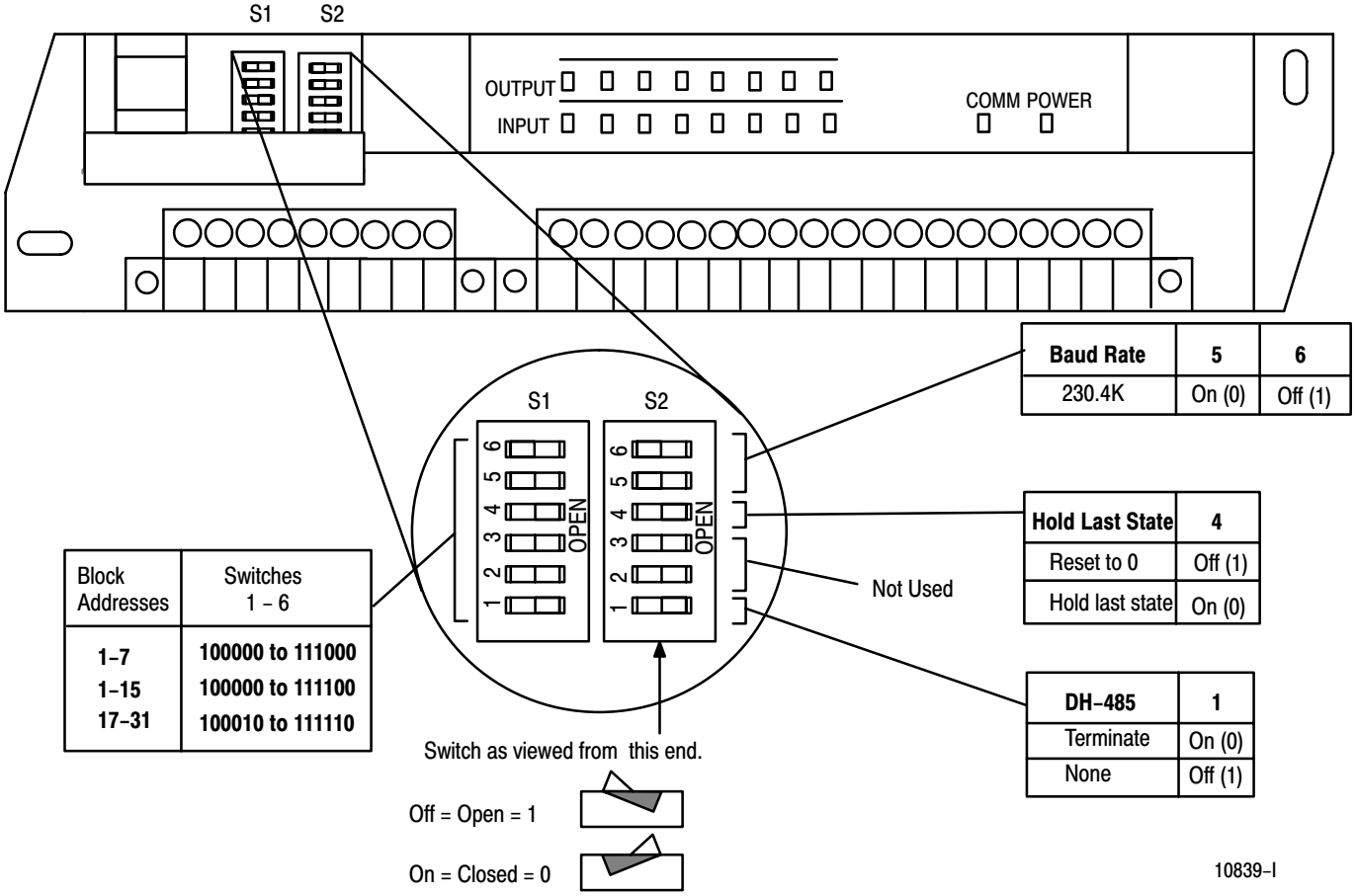
Setting the Configuration Switches

Each block I/O module has two 6–position DIP switches for setting:

- block address
- transmission (baud) rate
- last state or reset
- DH–485 termination

These switches are accessible by opening the door on the left side of the module (Figure 4.1).

Figure 4.1
Switch Settings for Block I/O when used with the SLC 500 Controller



Baud Rate	5	6
230.4K	On (0)	Off (1)

Hold Last State	4
Reset to 0	Off (1)
Hold last state	On (0)

DH–485	1
Terminate	On (0)
None	Off (1)

Block Addresses	Switches 1 – 6
1–7	**100000 to 111000**
1–15	**100000 to 111100**
17–31	**100010 to 111110**

Table 4.A
Addressing SLC 500 Controllers

Block Address	Switch S1 Positions						Block Address	Switch S1 Positions					
	1	2	3	4	5	6		1	2	3	4	5	6
1	Off (1)	On (0)	On (0)	On (0)	On (0)	On (0)	17	Off (1)	On (0)	On (0)	On (0)	Off (1)	On (0)
2	On (0)	Off (1)	On (0)	On (0)	On (0)	On (0)	18	On (0)	Off (1)	On (0)	On (0)	Off (1)	On (0)
3	Off (1)	Off (1)	On (0)	On (0)	On (0)	On (0)	19	Off (1)	Off (1)	On (0)	On (0)	Off (1)	On (0)
4	On (0)	On (0)	Off (1)	On (0)	On (0)	On (0)	20	On (0)	On (0)	Off (1)	On (0)	Off (1)	On (0)
5	Off (1)	On (0)	Off (1)	On (0)	On (0)	On (0)	21	Off (1)	On (0)	Off (1)	On (0)	Off (1)	On (0)
6	On (0)	Off (1)	Off (1)	On (0)	On (0)	On (0)	22	On (0)	Off (1)	Off (1)	On (0)	Off (1)	On (0)
7	Off (1)	Off (1)	Off (1)	On (0)	On (0)	On (0)	23	Off (1)	Off (1)	Off (1)	On (0)	Off (1)	On (0)
8	On (0)	On (0)	On (0)	Off (1)	On (0)	On (0)	24	On (0)	On (0)	On (0)	Off (1)	Off (1)	On (0)
9	Off (1)	On (0)	On (0)	Off (1)	On (0)	On (0)	25	Off (1)	On (0)	On (0)	Off (1)	Off (1)	On (0)
10	On (0)	Off (1)	On (0)	Off (1)	On (0)	On (0)	26	On (0)	Off (1)	On (0)	Off (1)	Off (1)	On (0)
11	Off (1)	Off (1)	On (0)	Off (1)	On (0)	On (0)	27	Off (1)	Off (1)	On (0)	Off (1)	Off (1)	On (0)
12	On (0)	On (0)	Off (1)	Off (1)	On (0)	On (0)	28	On (0)	On (0)	Off (1)	Off (1)	Off (1)	On (0)
13	Off (1)	On (0)	Off (1)	Off (1)	On (0)	On (0)	29	Off (1)	On (0)	Off (1)	Off (1)	Off (1)	On (0)
14	On (0)	Off (1)	Off (1)	Off (1)	On (0)	On (0)	30	On (0)	Off (1)	Off (1)	Off (1)	Off (1)	On (0)
15	Off (1)	Off (1)	Off (1)	Off (1)	On (0)	On (0)	31	Off (1)	Off (1)	Off (1)	Off (1)	Off (1)	On (0)
16	Invalid												

Addressing the Blocks Using SLC Controllers

The SLC controller communicates with the block I/O using a Distributed I/O Scanner module (cat. no. 1747–DSN) or an RIO Scanner module (cat. no. 1747–SN). The 1747–DSN scanner can address up to 7 blocks using an SLC 5/01 Controller, and up to 30 blocks using an SLC 5/02 Controller. The 1747–SN scanner, only used with the SLC 5/02 processor, can address 16 blocks. When used with the Distributed I/O Scanner module, block addresses must be contiguous. The actual number of blocks to which the 1747–DSN scanner module will communicate is determined when programming the SLC controller.

Refer to publication 1747–NM004 Series A, “Distributed I/O Scanner,“ and publication 1747–NM005 Series A, “RIO Scanner” for complete information on switch settings and addressing of the block I/O.

Chapter 5

Troubleshooting

Chapter Objectives

In this chapter you will learn about the LED indicators on the block I/O module, and how to use them to troubleshoot the unit.

LED Indicators

Each block I/O module has LED indicators (Figure 5.1) which provide indication of module status. Each module has the following:

- green communication indicator – indicates whether communication is occurring between processor or scanner and the block.
- red power indicator – indicates if power is applied to module and internal hardware status
- 16 I/O status indicators (8 input–8 output or 10 input–6 output) – reflect the state of the individual inputs and outputs (on or off)

Figure 5.1 shows the location of the indicators. Refer to Table 5.A for status indications reported by the indicators.

Figure 5.1
Indicators on the Block I/O Module (1791–IOBA/B shown)

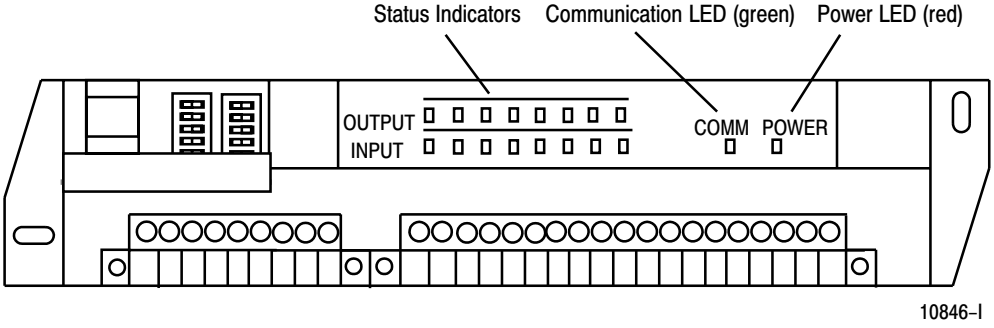


Table 5.A
Troubleshooting Chart

Indication	Probable Cause	Corrective Action
Green COMM LED on Red POWER LED on I/O status LED on/off	Normal indication	None required
Red POWER LED flashing	Block failed self–test, or a major fault is detected.	Cycle power to the block. If problem persists, replace the block.
Red POWER LED off	No 24V dc power connected, or hardware fault.	Check 24V dc power to block
Green COMM LED off	No communication with processor, scanner etc.	Check that power LED is on. Make sure that proper number of blocks are configured. Check remote I/O link or distributed I/O link wiring.
Green COMM LED flashing	Reset command (or output disable bit for SLC) has been issued by processor or scanner.	Check program. Correct as necessary.
	SLC or programmable controller not in run mode.	Place in run mode.

Appendix A

Specifications

General Specifications	
External power	200mA @ 24V dc; initial surge 5.5A for 10µsec. The supply must be able to source an additional 100mA plus an inrush current of 400mA when a peripheral is connected.
Environmental Conditions Operating Temperature Storage Temperature Relative Humidity	 32 to 131°F (0 to 55°C) –40 to 185°F (–40 to 85°C) 5 to 95% noncondensing
Conductors Wire Size	14 gauge stranded (maximum) 3/64 inch insulation (maximum)
Power Dissipation	IOBA/B: 13.94 Watts (maximum); 9.62 Watts (typical) IOBB/B: 13.05 Watts (maximum); 8.92 Watts (typical)
Thermal Dissipation	IOBA/B: 47.7 BTU/hr (maximum); 32.9 BTU/hr (typical) IOBB/B: 44.6 BTU/hr (maximum); 30.5 BTU/hr (typical)
Remote I/O Isolation	850V dc (transformer) for 1 second
DH–485 Isolation	850V dc (optocoupler) for 1 second
Interconnect cable length	RIO: PLC 57.6K 10,000 cable–feet 115.2K 5,000 cable–feet 230.4K 2,500 cable–feet SLC 230.4K 2,500 cable–feet DH–485 4000 ft (1219 meters)
Cable requirements	RIO/DIO – Belden 9463 DH–485 – Belden 9842
1791–IOBA/B Input Specifications	
Number of Inputs	8
Input type	Sinking
Input voltage range	20.5 to 27.6V dc
On–state input current	6.5mA (minimum) @ 20.5V dc
On–state input voltage	20.5V dc (minimum)
Off–state voltage	6.0V dc (maximum)
Off–state current	1.5mA dc (maximum)
Turn On time	1.5msec (maximum)
Turn Off time	1.0msec (maximum)

1791-IOBA/B Output Specifications	
Number of outputs	8
Output type	Source
Rated output voltage	10 to 30V dc
Maximum on-state voltage drop	1.5V dc @ 25°C
Maximum on-state current	0.5A
Minimum on-state current	15mA
Surge Current	3.0A for 10ms (maximum), 1 pulse per second max.
Off-state voltage	30V dc (maximum)
Off-state leakage current	0.5mA (maximum)
Turn on time	0.5ms (maximum)
Turn off time	1ms (maximum)

1791-IOBB/B Input Specifications	
Number of Inputs	10
Input type	Sinking
Input voltage	20.5 to 27.6V dc
On-state input voltage	20.5V dc (minimum)
On-state input current	6.5mA (minimum) @ 20.5V dc
Off-state voltage	6.00V dc (maximum)
Off-state current	1.5mA dc (maximum)
Turn On time	1.5msec (maximum)
Turn Off time	1.0msec (maximum)

1791-IOBB/B Output Specifications	
Number of outputs	6
Output type	Source
Rated output voltage	10 to 30V dc
Maximum on-state voltage drop	1.5V dc @ 25°C
Maximum on-state current	0.5A
Minimum on-state current	15mA
Surge Current (maximum)	3.0A for 10ms (max), 1 pulse per second max.
Off-state voltage	30V dc (maximum)
Off-state leakage current	0.5mA (maximum)
Turn on time	0.5ms (maximum)
Turn off time	1ms (maximum)

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Publication 1791–6.5.8 – April 1992
Supersedes publication 1791–6.5.8 – March 1992

P/N 955112–02
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